

REFERENCES

- AGHARKAR, S. P. (1912) : The diet of a Bull-frog (*Rana tigrina*). *J. Bombay nat. Hist. Soc.* **21** (2) : 687.
- AITKEN, E. H. (1895) : Food of the Bull-frog. *ibid.*, **21** (2) : 500.
- ANONYMOUS (1962) : *Ind. Trade Jour.* (Dept. Commercial Intelligence and Statistics) 19th May 1962.
- ARUNDALE, RUKMINI DEVI (1964) : News and views. *Animal Citizen* **1** (4) : 58.
- BHADURI, J. L. (1945) : The Indian Bull-frog (*Rana tigrina* Daud.) a menace to fishery. *Sci. and Culture* **11** (4) : 205-206.
- CHIBBER, H. M. (1911) : The food of a Bull-frog. *J. Bombay nat. Hist. Soc.* **20** (3) : 865.
- DAVIDSON, N. (1916) : Food of the Bull-frog (*Rana tigrina*). *ibid.* **25** (1) : 152.
- DHARMAKUMARSINHJI, R. K. (1940) : Frog eating a snake. *ibid.* **42** : 200.
- GOSTLING, D. (1895) : The food of the Bull-frog. *ibid.* **10** (1) : 150.
- ISHWAR PRAKASH (1953) : Addition to recorded food items of the Bull-frog (*Rana tigrina*). *ibid.* **51** (3) : 750.
- JAMESON, D. L. & ROSE, M. M. (1956) : Food habits in juvenile frogs. *Copeia* **1956** (4) : 261.
- KADAM, M. V., BHAT & PATEL, G. A. (1960) : 'Crop pests and how to fight them', Dir. Pub. Govt. of Maharashtra, Bombay.
- KAMAT, N. D. (1962) : On the intestinal contents of tadpoles and algae of small ponds. *Curr. Sci.* **31** : 300-301.
- MAHENDRA, B. C. (1929) : Do frogs eat snakes? *J. Bombay nat. Hist. Soc.* **33** (3) : 724.
- MCCANN, C. (1933) : Notes on Indian Batrachians. *ibid.* **36** : 161.
- MULLAN, J. P. (1912) : The food of a Bull-frog (*Rana tigrina*). *ibid.* **21** (4) : 1341.
- RAO, Y. R. & CHERIAN, M. C. (1940) : Control of the rice grass-hopper, I. *Indian Farming* **1** (9) : 433-436.
- SUNDERA RAJ, B. (1915) : Bull-frog and rat snake. *J. Bombay nat. Hist. Soc.* **23** (4) : 789.
- WADEKAR, U. L. (1963) : The diet of the Indian Bull-frog (*Rana tigerina* Daud.). *ibid.* **60** (1) : 263-268.
- WHIFFIN, J. D. (1895) : Food of the Bull-frog. *ibid.* **9** (3) : 334.
- ZUTSHI, B. N. (1926) : A Bull-frog (*Rana tigrina* Daud.) swallowing a rat. *ibid.* **31** (1) : 228.

21. NOTES ON ANIMAL RELATIONSHIPS : HYPERIID AMPHIPODS *PHRONIMA COLLETTI* BOVALLIUS AND *PHRONIMA SEDENTARIA* (FORSKÅL) INHABITING EMPTY 'TESTS' OF PELAGIC TUNICATES

During the 35th cruise of the USSR Research Vessel *Vityaz* in the eastern sector of the Indian Ocean in 1962 some interesting animal relationships of two species of phronimid amphipods, *Phronima colletti* Bovallius and *P. sedentaria* (Forskål) inhabiting the empty 'tests' of pelagic tunicates *Salpa* sp. and *Doliolum* sp. respectively were observed, which are reported here.

1. *Phronima colletti* Bovallius. 10 young forms measuring 1.5 mm. in total length attached to the wall of the empty test of *Salpa* sp. measuring 9 mm. in length, were collected at *Vityaz* Station no. 5224 on 10-ix-1962 (02° 00' N., 91° 33' E., depth 0-200 m.). These phronimids were attached in a single group and composed of individuals of the same instar. The characteristic shape of the carpus in the fifth peracopod is distinctly discernible (*vide* Stephenson, 1924).

2. *Phronima sedentaria* (Forskål). An adult female measuring 30 mm. was obtained within the empty test of *Doliolum* sp. measuring

31 mm. collected at Vityaz Station no. 5185 on 27-vii-62 (24° 34' S., 108° 20' E., depth 0-200 m.).

In the literature there are records of adults and juveniles of *P. sedentaria* (Forskål) inhabiting the empty mantles of pelagic tunicates (Chevreux & Fage 1925, Mogk 1927, Barnard 1932, 1937, and Nagabhushanam 1960). However, there appears to be no record of the young forms of *P. colletti* Bovallius inhabiting the empty mantles of tunicates. Moreover, the duration of stay of the young instars and the size attained within the mantle-cavity by the species of the genus *Phronima* other than *P. sedentaria* (Forsk.), is not known. Therefore it is considered worthwhile recording, this interesting relationship, and the measurements of the adult and juveniles obtained. More information on the stages at which the juveniles desert the mantle in the different species of the genus *Phronima* would be worth recording.

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REFERENCES

- BARNARD, K. H. (1932): Amphipoda. 'Discovery' Reports 5: 1-174.
 ——— (1937): Amphipoda. 'John Murray Exp.' Sci. Rep., 4 (6): 131-201.
 CHEVREUX, E. & FAGE, L. (1925): Amphipodes. Faune de France 9: 1-488.
 MOGK, H. (1927): Die Phronomiden der Deutschen Sudpoler Expedition, 1901-1903. Deutsch. Sudpol. Exp. 19. Zool. 11: 125-144.
 NAGABHUSHANAM, A. K. (1960): Observations on some pelagic tunicates in coastal waters of the Bay of Bengal. J. Mar. biol. Ass. India, 2 (2): 2.
 STEPHENSON, K. (1924): Hyperiidæ—Amphipoda (Pt. 2. Paraphronimidae, Hyperiidæ, Dairellidae, Phronomidae, Anchylomeridae)—Dan. Ocean Exp. 1908-1910 to Mediterranean and adjacent Seas, 2 D. 4: 71-149.

22. NOTE ON *MASTIGOCHIRUS QUADRILOBATUS* MIERS, AN ANOMURAN (CRUSTACEA: DECAPODA) NEW TO INDIA

Mastigochirus quadrilobatus Miers is an anomuran which has not been reported from India so far. During the course of our study on the systematics of the anomuran fauna of Waltair coast, 10 specimens of *M. quadrilobatus* were collected from Lawson's Bay area, Waltair. In this paper a short account of the diagnostic features of *M. quadrilobatus* is given.

Mastigochirus quadrilobatus Miers 1879

Diagnosis. Frontal margin with two submedian lobes flanked by a lateral lobe which is round and projects slightly beyond the median